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Mpc Based Mppt Even Under Various Irradtiations And Neuro Fuzzy Based Grid Interconnected Renewable System

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ABSTRACT: With constant population growth and the rise in technology use, the demand for electrical energy has increased significantly. Increasing fossil-fuel-based electricity generation has serious impacts on environment. As a result, interest in renewable resources has risen, as they are environmentally friendly and may prove to be economical in the long run. However, the intermittent character of renewable energy sources is a major disadvantage. It is important to integrate them with the rest of the grid so that their benefits can be reaped while their negative impacts can be mitigated. In this, an energy management algorithm is recommended for a grid-connected micro grid consisting of loads, a photovoltaic (PV) system and a battery for efficient use of energy. A model predictive control-inspired approach for energy management is developed using the PV power and consumption estimation obtained from daylight solar irradiation and temperature estimation of the same area. An energy management algorithm, which is based on a neuro-fuzzy inference system, is designed by determining the possible operating states of the system. The proposed system is compared with a rule-based control strategy. Results show that the developed control algorithm ensures that micro grid is supplied with reliable energy while the renewable energy use is maximized.

Keywords: Solar Panel, DC - DC Chopper, MOSFET, Battery, Inverter, load (lamp).

1. INTRODUCTION

Sustainable power source assets like solar energy, Fossil fuel, Biomass and wind will end up option for future vitality needs because of expanding ecological concern, cost and the carbon effect of petroleum products. India is a country that aims at balancing the variable yield of sustainable power sources situated in few states and coordinating them into grids system. Renewable energy sources assume a crucial job in voltage generation.

These new facilities establish new criteria and requirements for integrating distributed energy resources (DERs) into electrical power systems. An increasing number of DER interconnections changes the distribution system interaction with the bulk power system. It also transforms the distribution system into an active source of energy. Consequently, enhanced state - of the - art capabilities for active power control and reliability services have been reflected in proposed changes in IEEE 1547-2018 Standard for Interconnecting Distributed Resources with Electric Power Systems. In the context of the standard, DER is regarded as a source of electric power that is not directly connected to a bulk power system.

2. OBJECTIVES

With everybody being in a very fast world, technologies are increasing speedily. To improve the performance of Maximum Power Point Tracking (MPPT) method for the photovoltaic (PV) system.Passive LC circuit is used to cancel out the double frequency pulsation on dc-link.MATLAB simulation is carried out, to evaluate the effectiveness of the proposed system.

3. LITERATURE REVIEW

Y. Liu, M. Huang, H. Wang, X. M. Zha, J. W. Gong, and J. J. Sun, implemented Lifetime is an important performance factor in the reliable operation of power converters. However, the state-of-the-art LC filter design of a buck dc-dc converter is limited to the specifications of voltage and current ripples and constrains in power density and cost without reliability considerations. This paper proposes a method to optimize the design of the LC filters from a reliability perspective, besides other considerations. An enhanced model is derived to quantify the lifetime of the capacitor in the filter considering the electro thermal stress on it. Furthermore, the influence of different design aspects such as the value of capacitance, the value of inductance, and the type of the capacitor have been discussed, focusing on their impacts on the key design objectives, which are the cutoff frequency, lifetime, and volume. Based on the analysis, an optimized design is proposed among different parameter sets. A 1-kW converter prototype is applied to verify the theoretical analysis and simulation.
Serbanimplementedan active method for double-frequency power ripple decoupling in single-phase inverters is presented in this paper, exhibiting the main advantage of not using additional power semiconductors besides the H-bridge. The proposed method requires only two capacitors placed between the midpoint and one end of each inverter leg.

J. Hu, J. Zhu, S. Member, D. G. Dorrell, and S. Member implemented the controller uses a system model to predict the system behavior at each sampling instant. The voltage vector that generates the least power ripple is selected using a cost function and applied during the next samplingperiod; thus, flexible power regulation can be achieved. In addition, the influence of a one-step delay in the digital implementation is investigated and compensated for using a model-based prediction scheme. Furthermore, a two-step horizon prediction algorithm is developed to reduce the switching frequency, which is a significant advantage in higher power applications. The effectiveness of the proposed model predictive control strategy was verified numerically by using MATLAB/Simulink and validated experimentally using a laboratory prototype.

4. EXSITING SYSTEM

Control system response is slow. Traditional MPPT technique is used for solar power extraction. Efficiency of the converter is less.

5. PROPOSED SYSTEM

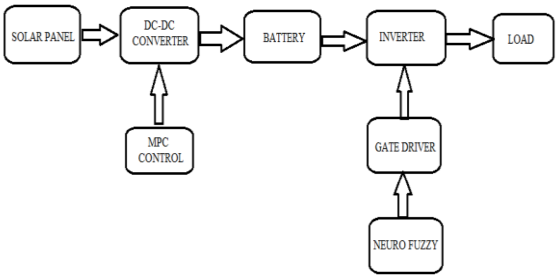

Fig 1 :Proposed block diagram

Neuro-Fuzzy based MPC-inspired energy management is proposed for grid connected micro grids. Since energy production and consumption data are estimated in the recommended energy management, the model is provided with predictive control by planning energy management by the algorithm. Considering the charging status and the production estimated from the renewable source, the battery is ensured not to be de-energized and at the same time to draw as little energy from the grid as possible. With the recommended algorithm, the energy level in both devices was managed and it charge/discharge amount was decided for the battery.

The proposed algorithm and ANN-prediction algorithm were implemented and the grid-connected system was simulated. The results verify that the developed energy management system predicts the load and generation with high accuracy. The grid usage is reduced with the system recommended according to RBC. Consequently, less energy exchange with the grid ensures that the bills are lower. Battery usage in the recommended system is less than RBC, so battery life is extended. With the recommended management, it was ensured that the battery group has a longer cycle life by reducing the charge/discharge period of the battery by preventing the battery from continuously switching on and off in a small power change. All these benefits encourage investors and house-owners towards use of more renewable, even if that requires some storage installation.

6. METHODOLOGY

The construction of the pure sine wave inverter can be complex when thought of as a whole but when broken up into smaller projects and divisions it becomes a much easier to manage project. The following each specific part as well as each section is constructed and interacts with other blocks to result in the production of a 120 volt pure sine wave power inverter. Pure sine wave inverters are able to simulate precisely the AC power that is delivered by a wall outlet. Usually sine wave inverters are more expensive then modified sine wave generators due to the added circuitry. This cost, however, is made up for in its ability to provide power to all AC electronic devices, allow inductive loads to run faster and quieter, and reduce the audible and electric noise in audio equipment, TV's and fluorescent lights. Power inverters are used today for many tasks like powering appliances in a car such as cell phones, radios and televisions. They also come in handy for consumerswho own camping vehicles, boats and at construction sites where an electric grid may not be as accessible to hook into.

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Inverters allow the user to provide AC power in areas where only batteries can be made available, allowing portability and freeing the user of long power cords.

7. RESULT AND DISCUSSION

Through careful handling of control signals in the circuit, the MOSFETs in the H-bridge were correctly switched, resulting in a Constant Voltage output waveform without the double frequency pulsation.

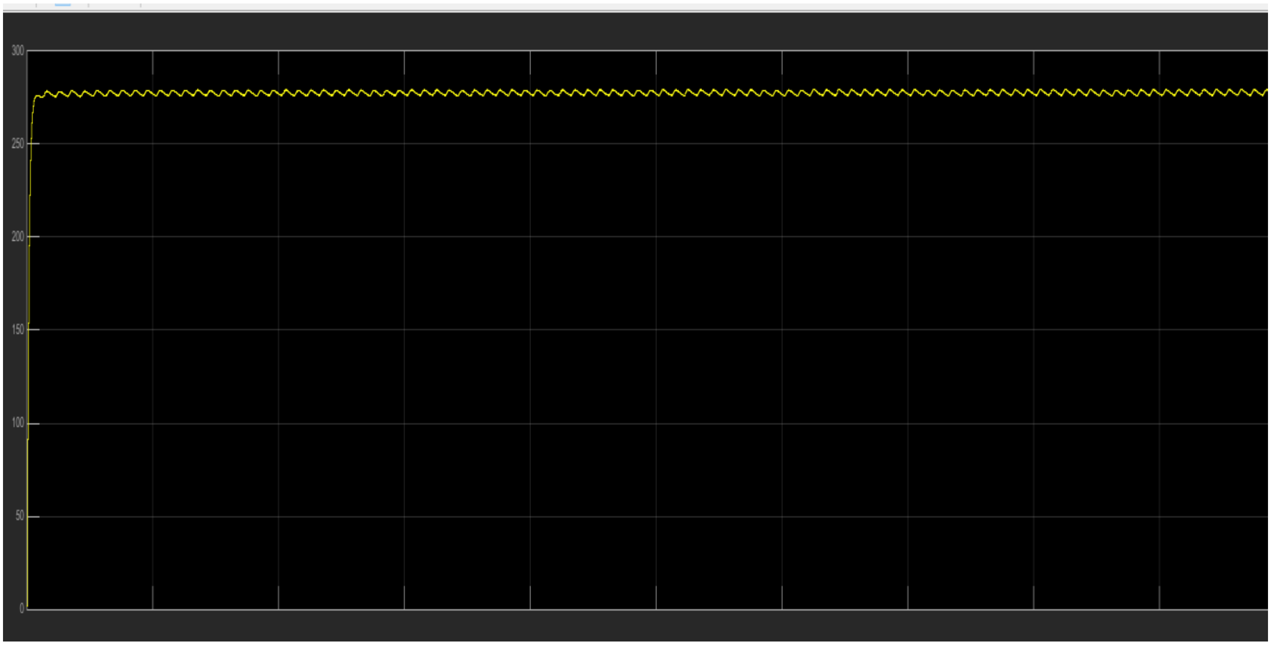

Fig 2: Simulation Result for Output Voltage Waveform

The output shown above was for an input voltage of 12V and a load after the filter. The amplitude of the output wave was only 14V pk-pk, a discrepancy easily explained by the low ratio of sine wave to triangle wave control signals. Once tuned for high voltage operation, the gain on the non-inverting amplifier for the reference sine will be increased to output a 340V pk-pk signal when the input is 200V. If necessary, the frequency of the signal can be adjusted by changing resistor values in the sine wave generator (Bubba) circuit.
While the operation of the inverter works under light or medium loads (above 50 with 12V input), its output was affected by high frequency oscillations when heavier loads were connected. This occurrence was caused by the components in our filter design. Use of chokes as inductors resulted in core saturation when the current in the circuit was above approximately .5A. Chokes are intended for AC filtering applications, but are intended to be connected in a different manner to prevent high frequency noise from corrupting a clean source. Core saturation resulted in our filter acting more like a resistance and thus allowed oscillations at the carrier frequency through to the source.
Even with the filter problems experienced, the three level PWM signals were generated correctly and could be used to power resistive loads before the filter. Although this is true, we avoided the core saturation problem by doubling the switching frequency and reducing the inductance values in the filter. Through proper component selection in another revision, the

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switching frequency could be returned to 50 Khz. This would involve the use of a higher capacitance/voltage non-polarized capacitor and a smaller inductor to avoid core saturation. While components capable of meeting these requirements exist, there was insufficient time to order them and test their operation in the circuit.
With the exception of the filter problems mentioned above, the circuit is functioning as designed and correctly inverts a DC voltage to an AC voltage. The efficiency and the inverter was not calculated due to the amount of time spent in design verification and testing, a problem addressed in the Recommendations section

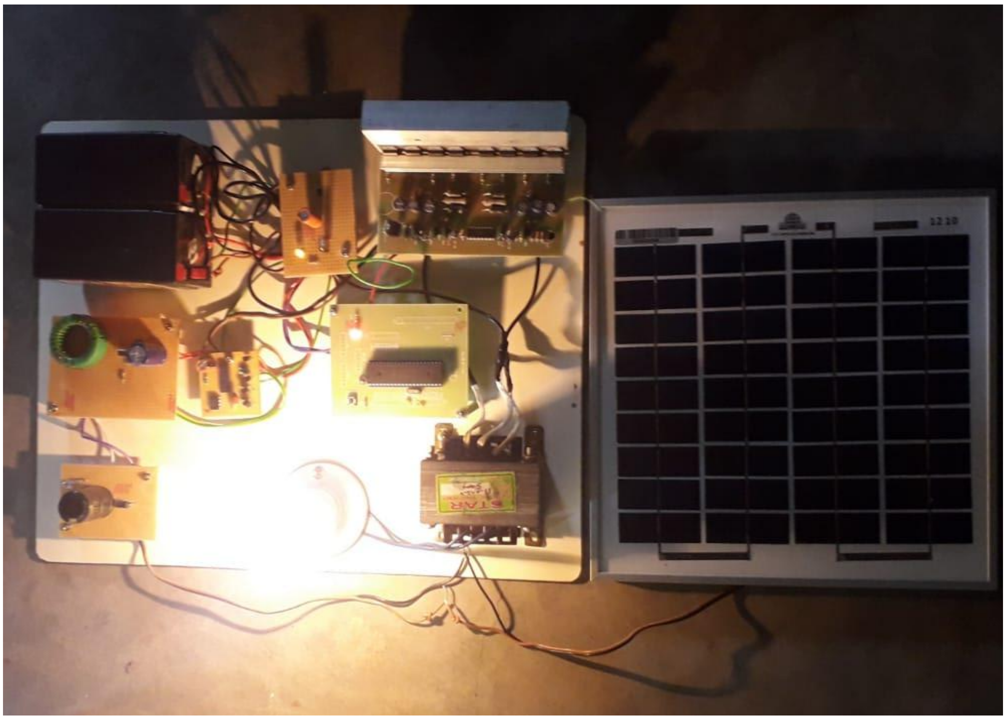

Fig 3: Hardware Implementation

12V solar panel is connected to the DC-DC converter and it's fed to the boost converter. Here MOSFET act as the boost converter. IC5555 generates the pulse generator in MOSFET is act as the switches in boost converter. Battery uses to store the sources from the solar panel. The battery connected to the inverter. The first four MOSFET connected to the primary winding and second four MOSFET is connected to the secondary winding. The secondary winding is connected to the algorithm module and MMPT micro controller grid. From that it will convert the direct source to alternating current source. And output voltage source is fed to the grid at maximum load.

8. CONCLUSION

This project to obtain a pure sine wave DC-AC inverter, the output at a constant peak voltage level with 250 watt output, will be cheaper to manufacture, and is quite efficient in the method it produces. To produce a ripple and 120 volt RMS sine wave with the capability to provide 250 watts of power. It is the capability that a closed loop control circuit can be implemented. The looking of the efficiency in this, there is no hard date to refer as there was not enough time was available to collect it. The components and also are chosen prior to the actual manufacture of the inverter, were built at effectively and keep power losses to a minimum. One of the main factors in the power savings is the use of a three level PWM signal instead of a two levels, this leads to very low average power output to generate the required sine wave and aids in the efficiency of the device. Simple additional outputs such as circuit protection and closed loop control system can improve the performance.

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